

Tropical GRIP Forecast Discussion for September 9, 2010

Created 1600 UTC September 9, 2010

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Summary: Today is once again a no-fly day for the GRIP field campaign for all aircraft, however increasingly interesting potential Atlantic Basin targets are becoming apparent, and more active. While Ex-Gaston continues to disappoint, PGI-44L/AL92 has begun to take its spotlight, as a system the global models develop in the two to three day time period. PGI-39L does not appear favorable for development and dry air is beginning to surround the pouch, however to its southeast, Tropical Storm Igor continues its westward trek across the East Atlantic, wrapping the smaller and weaker PGI-42L pouch into it. Over Africa, PGI-43L is forecast by models to emerge and develop quickly, similar to Igor.

Forecast for 1600 UTC 9/09/2010:

Synoptic Overview:

There are quite a few features in the Atlantic basin to discuss today (**S1**). Beginning with the western half of the basin, an upper level ridge is dominating the flow in the northern half of the Gulf of Mexico (**C1**), and controlling the overall flow of any convection in the Gulf and over FL (**S2, S3**). The rest of the Gulf is nearly devoid of convection, and there is only some scattered convection in the Bahamas associated with some low level troughiness north of Hispaniola/remnants of Ex-Gaston. In the Caribbean at upper levels, a cold low is located just south of Cuba's western tip (**C1, C3**), and broad upper level easterlies dominate the rest of the Caribbean. At lower levels, a north-south elongated trough is associated with the developing PGI-44L (**S4, C4**). Additionally, Ex-Gaston is located to the east-southeast of Jamaica and is poorly organized with its convection well offset from its vorticity center (**S3**). Wind shear in the region is high over the Gulf and generally low over the Caribbean (**C2**).

Dry air extends from 45W to 70W across the central North Atlantic Ocean (**S6**), but the dust concentration in this area is low (**S5**). However, the area where the waves are tracking is generally also a low shear zone (**C2**), whereas further north, closer to the Subtropical Ridge, shear increases dramatically. The TPW maximum across these longitudes is further to the south, and is coincident with ITCZ convection. Water Vapor at upper levels maintains this same orientation, which will confine any successful westward moving systems to a southern, westward track across the Atlantic toward the Caribbean. PGI-39L has taken a more northward track, and as it has neared the ridge, dry air is being pushed to wrap around the center of the pouch, which will certainly continue to inhibit convection, and development, with this system.

Further east in the Eastern Atlantic off of Africa, PGI-41L/Tropical Storm Igor is located at approximately 14.7N/24.8W in a TPW maximum (**S4**) and convection today is less well organized with this system than yesterday during its quick development (**S7**). Igor has absorbed PGI-42L today, and Igor's low level structure can be seen well in the

Africa low level vorticity and winds plots from CIMSS (**C6, C7**). Igor is under the influence of easterlies at mid to upper levels, pushing the system westward (**C9**), as well as residing in a region of low shear. Contrary to this, PGI-43L is having to battle off shear, but still has a way to go before leaving the African continent. West Africa and the East Atlantic continue to be dominated by the Azores High to the north and the AEJ over southern West Africa (**C7, C9**).

Features of Interest:

Ex-Gaston/PGI-38L:

At 1200 UTC today, the CIMSS PREDICT TPW analysis with pouch positions shows the remains of Gaston are located at 17.3° N and 74.3° W (**S4**). The current visible and IR satellite imagery shows a few disorganized clusters of convection associated with this system just to the west of Jamaica (**S2, S3**). The water vapor loop provides evidence of some dry air to the east of the system associated with an interacting upper level trough (**S6**). Water vapor imagery shows that ex-Gaston is currently in a moist environment and SAL analysis shows further evidence that there is little dry air in the vicinity of the system (**G1**). Today's 0600 UTC analysis shows that there is very little dust surrounding the system at 850-hPa (**G2**), 700-hPa (**G3**), or 500-hPa (**G4**). Therefore, while it was thought that dust and dry air in the vicinity of the pouch may have been a contributing factor in the inhibition of redevelopment, it does appear that this is no longer a problem. Lastly, the current MIMIC's total precipitable water imagery shows that a very moist environment is currently situated over much of the western Caribbean (**S4**). Ex-Gaston had been under the influence of moderate wind shear for several days as it tracked across the eastern Caribbean which may have been a contributing factor to its ultimate demise. Today's 0600 UTC wind shear analysis shows that although there is 10-15-kt of southerly wind shear to the east of ex-Gaston, there is finally a low shear environment across the system itself (**G5**). Currently, the remnants of Gaston are over very high oceanic heat content and 29-30°C SSTs (**G6**).

Models have really backed off on redeveloping this system as it continues to move westward towards Central America over the next couple of days. Neither the GFS nor the ECMWF 48-hr. forecast (**G7, G8**), for instance, shows evidence of ex-Gaston in the northwestern Caribbean. While the conditions across the system are somewhat more conducive to development now than they have been over the last several days, and while such conditions may persist over the next couple of days, it may be too little too late. Time will tell if Gaston has passed on.

PGI-44L/AL92:

The ECMWF has been indicating development in the southern Caribbean originating in the ITCZ for several days now, and the other global models are now beginning to agree. The ECMWF, GFS, NOGAPS, and UKMET all indicate that an ITCZ vorticity max associated with a large amount of convection, now AL92, has the potential to develop anytime within the next 2-5 days. The system appears better organized on visible and IR satellite today (**44A**). Band-like features are beginning to be present; notable in Microwave imagery (**44B**), and surface observations in the southeast Caribbean indicate that a weak surface circulation is present. The system will be moving

into a very favorable environment with extremely high ocean heat content (**44C**), and shear well below 20kts (**C2**). The 1200 UTC SHIPS text product indicates MPIs of 150-160kts, despite the fact that the BAMM track actually misses the maximum heat content to the south.

The models indicate that a general WNW track is expected (**44D**). The ECMWF has remained consistent in its development of AL92 for several days now, while the GFS is trending towards a stronger system. Interestingly, pouch tracking for the GFS indicates a weakening of the system after 60 hours despite the deepening of a surface low at this time. It is unclear why the discrepancy exists, however given the very favorable environment, it seems unlikely that the system will weaken after a few days. The only factor that could contribute to weakening appears to be dry air to the north of 92L. TPW loops indicate that some of this could eventually wrap around the system, however there is no indication that it would infiltrate into the pouch before genesis (**44E**). NHC has a 40% probability of development within the next 48 hours, and the development of a tropical depression is very likely within the next 4-5 days.

PGI-39L/AL99:

PGI-39L/AL99 as of 1200 UTC is located at 18N and 43W. Water vapor (**S6**) and dry air analyses (**D1**) show a hostile environment around the system, with some dry air possibly making it into the pouch. Unlike recent forecasts, moderate dust concentrations around this system are found at upper (**39A**) and lower levels (**39B**). However, the system is forecasted to have increasing vorticity and OW values with decreasing shear values within the next 48 hours, both in the GFS and ECMWF models (**39C**). PGI-39L maintains its position as the leader of the wave train currently evolving off the western coast of Africa. The subtropical high is forecasted to remain directly northward of the evolving wave train within the next 24 to 48 hours, blocking any potential northward turn that AL99 could make. The GFS forecasts PGI-39L to become more organized in the next 48 hours, but not developing into a major system, likely due to the dry air wrapping around the system. The ECMWF (**39D**) forecasts PGI-39L to reach slightly larger values of vorticity and similar OW values. However, ECMWF diminishes the system within the next 48 hours, similar to its other recent forecasts. PGI-39L continues to be an unlikely target for GRIP due to its location and forecasted weakening.

Tropical Storm Igor/PGI-41L and PGI-42L:

After quickly undergoing TC genesis yesterday morning, Igor has since failed to become better organized. Igor's position as of the 1500 UTC advisory is 14.7N/24.8W, or just southwest of the Cape Verde Islands, with an intensity of 35 kts. Deep convection continues to fire near and towards the west of the circulation center (**I1**). According to the latest ASCAT pass, Igor still possesses a relatively well-organized surface circulation (**I2**), although the winds indicated are below 34 kts. Current surface observations in the Cape Verde Islands indicate winds are generally from the east at around 20 kts. The 1200 UTC SHIPS analyzes the easterly shear at 20 kts, which is likely contributing to the lack of intensification thus far. Igor is currently located within a very large and well-defined pouch of moisture, with total precipitable water around 60 mm (**I3**). PGI-42L

has been absorbed by Igor and is no longer being analyzed. It is currently unclear what impact this absorption has had on Igor's structure.

The GFS, ECMWF, and other global models continue their strong agreement on the intensification of Igor over the next several days (**I4, I5**), and the statistical and dynamical models indicate substantial intensification as well (**I6**). The strong easterly shear is still expected to diminish over the next couple days, and sea surface temperatures are expected to remain around 28C along Igor's track. PGI-39L appears to have moistened the environment ahead of Igor (**I3**), so dry air is not expected to be an issue. The official NHC intensity forecast calls for 70 kts in 72 hours, and 85 kts in 120 hours.

Over the next 5 days, the track is projected to be generally towards the west-northwest (**I7**). Near the end of the 5-day period, Igor is projected to take a northwestward turn away from the Leeward Islands. This is due to a deep trough over the northeastern U.S. and western Atlantic, evident at the surface (**I4**) through the mid-troposphere (**I8**). It is unclear at this point whether Igor will present a potential GRIP target, but the situation will continue to be monitored.

PGI-43L:

Although still well inland over Africa and model confidence is still low, this feature is of some interest because almost all models, including the GFS (**I4**), ECMWF (**I5**), and their ensembles, continue to develop this into a tropical cyclone in as little as 3-4 days near the Cape Verde Islands. Due to the early development, the models appear to recurve this in the eastern Atlantic, but this system will be monitored more closely once it emerges off the coast of Africa.

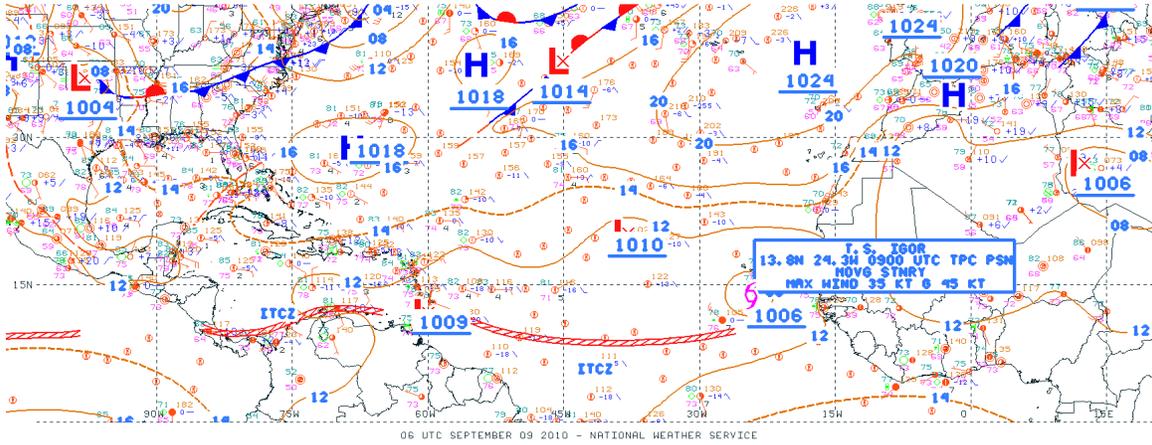
Dust/SAL Discussion:

The SAL continues to wrap around PGI-39L and persist to the north of Tropical Storm Igor (**D1**) despite being analyzed as slightly less intense than yesterday. The latest MODIS true color imagery shows dust exiting the African coast and wrapping down towards Igor (**D2**). Water vapor depicts a broad area of dry air evident in the Central Atlantic extending from Puerto Rico back east towards the African coastline (**S6**). An AIRS sounding at 20.71°N, 44.72°W in the middle of this dry air region shows a layer extending through most of the troposphere (**D3**). To the north of Igor at 22.68°N, 22.74°W AIRS depicts modest dry air throughout the troposphere, not nearly that of the magnitude seen in the Central Atlantic (**D4**).

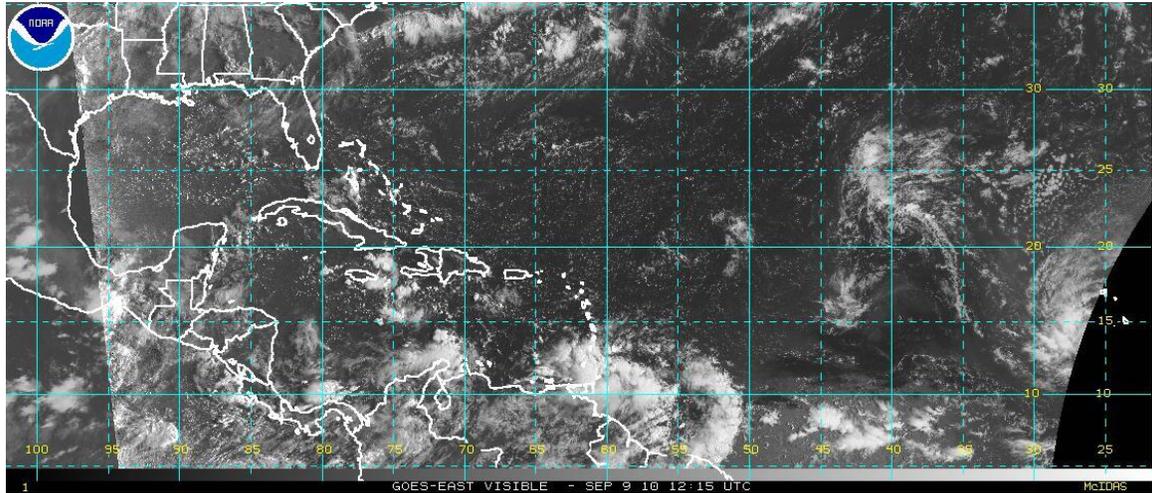
The GEOS-5 model 0600 UTC initialization depicts 700 hPa dust activity confined largely to the Eastern Atlantic (**39A**) while at 200 hPa it extends from Hispaniola back through Africa (**39B**). The next dust plume is forecast to exit Africa at 0600 UTC tomorrow (**D5**) with the strongest push off of the African continent occurring Saturday. At upper levels the dust maxima seen initially off the coast of Mauritania is projected to decay as it propagates Westward by 1200 UTC Friday (**D6**), with much of the dust activity at this level remaining roughly the same throughout the duration of the forecast period. It is also worth noting that forecast tracks for PGI-44L tend to keep the system south of the dust and dry air influences.

Images used in discussion:

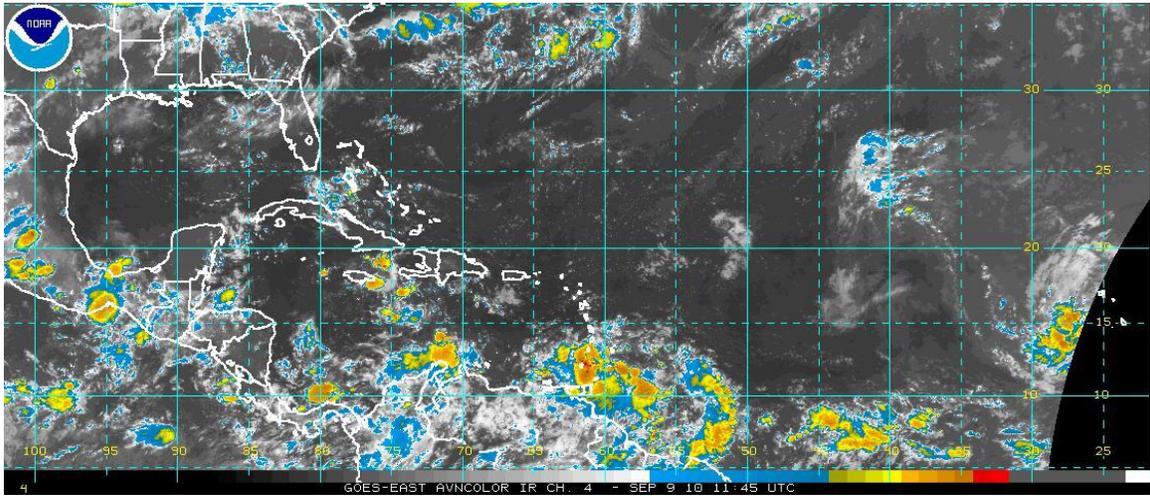
S1



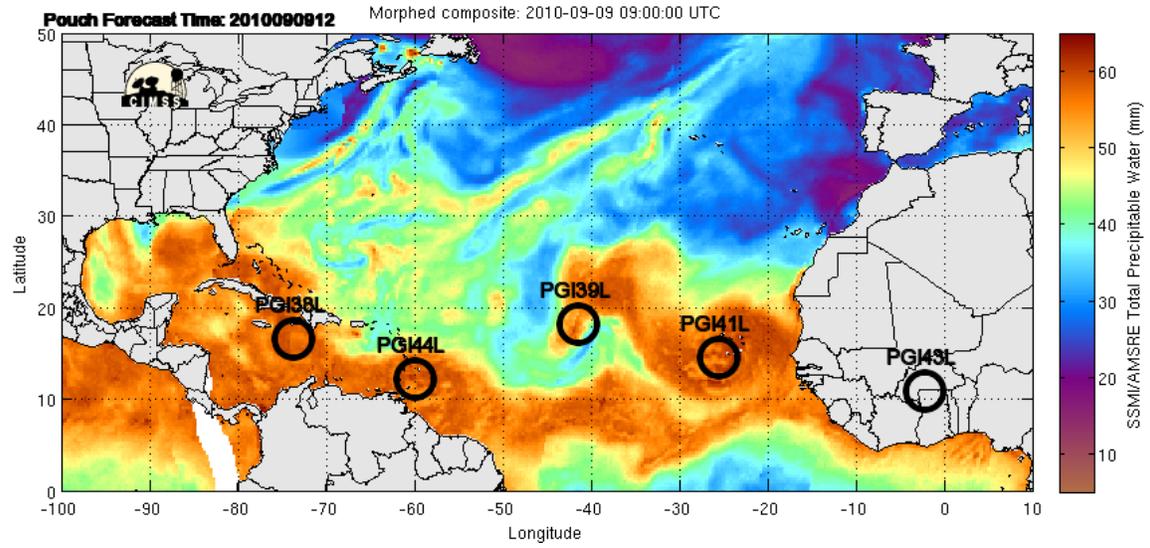
S2



S3

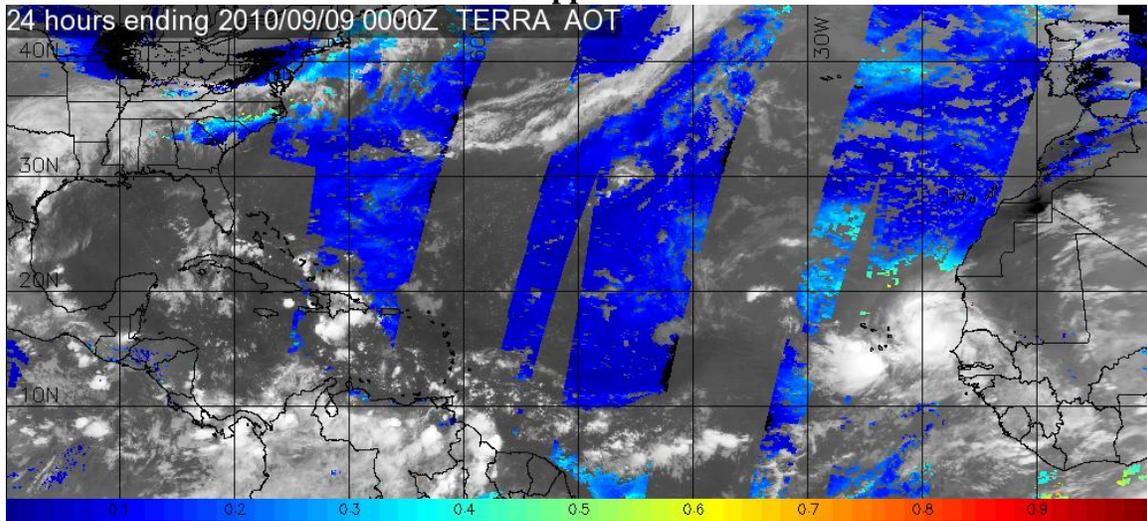


S4

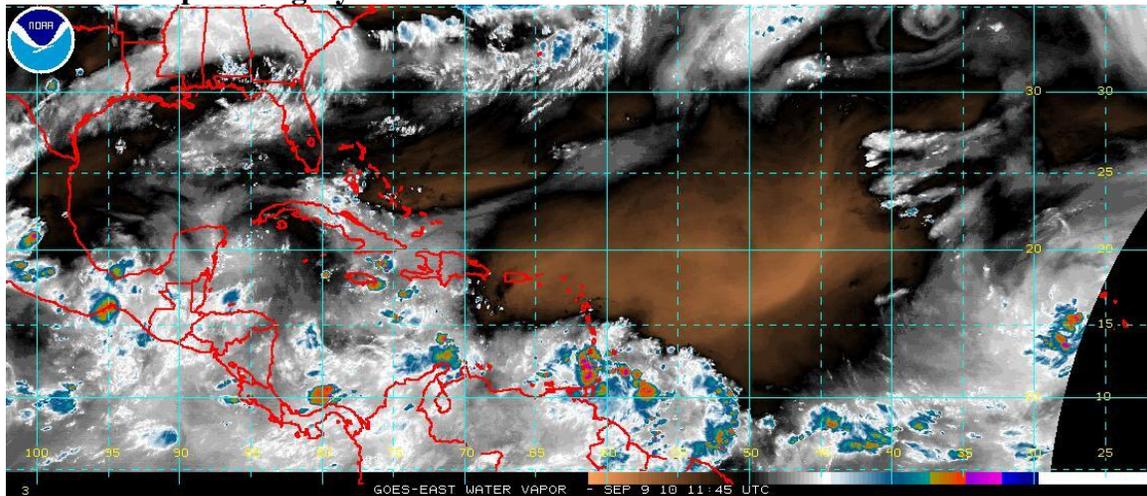


S5 AOT from MODIS via JPL GRIP Support Site

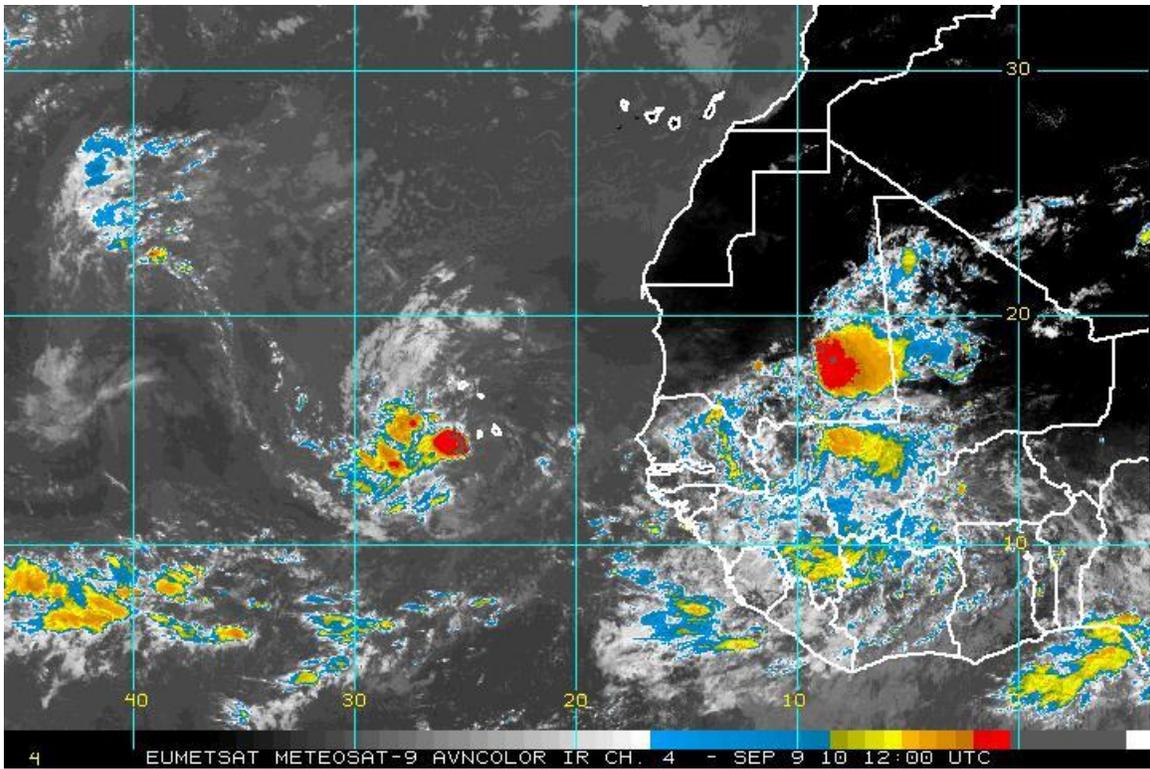
24 hours ending 2010/09/09 0000Z TERRA AOT



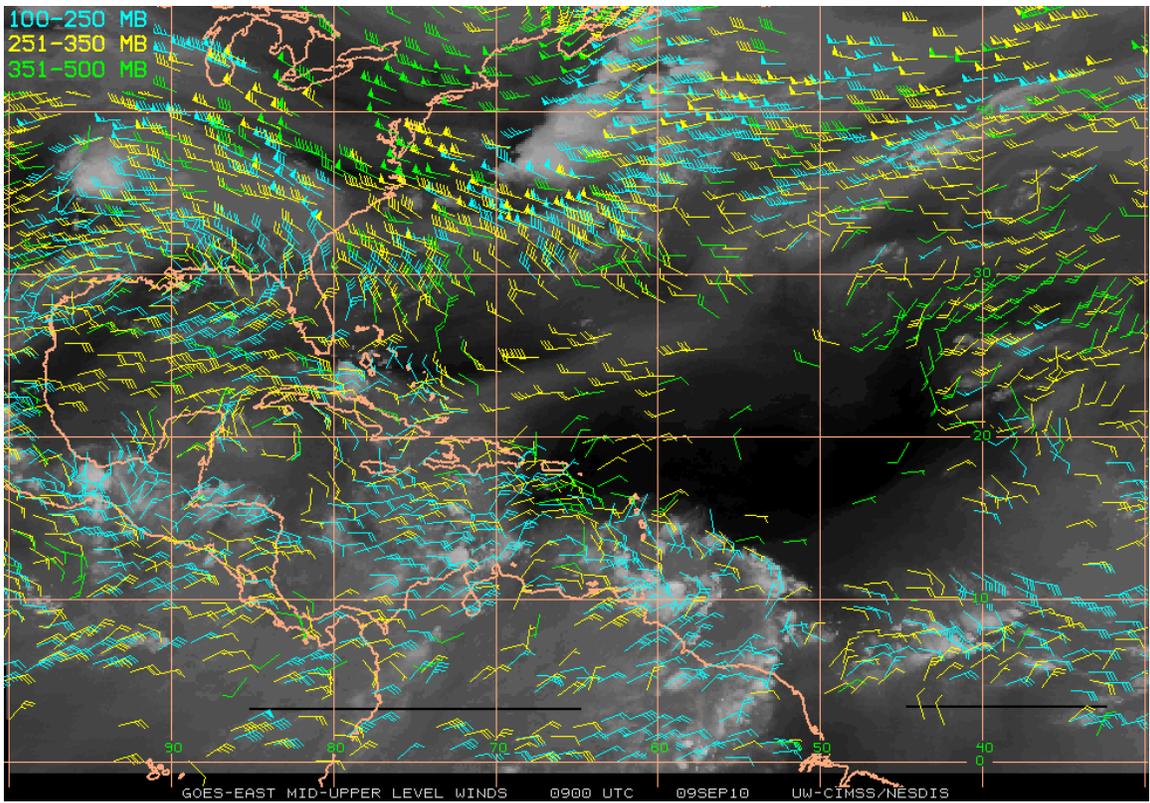
S6 Water Vapor Imagery



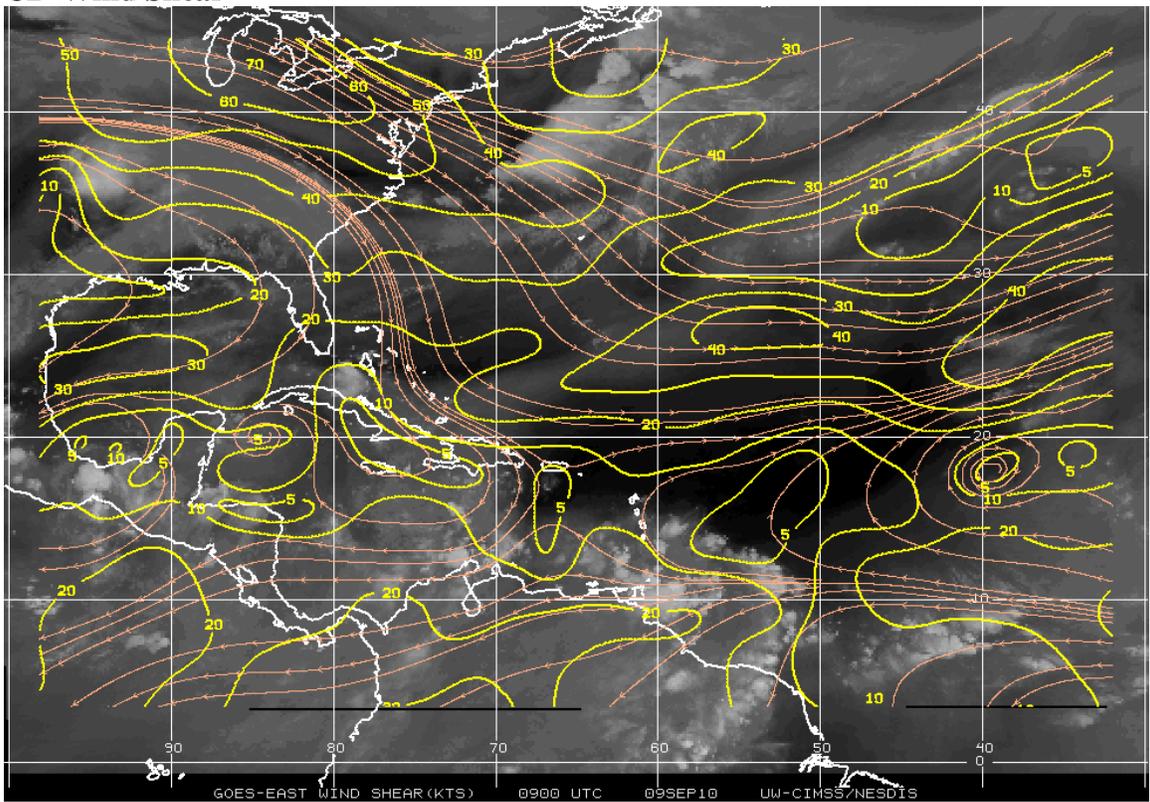
S7



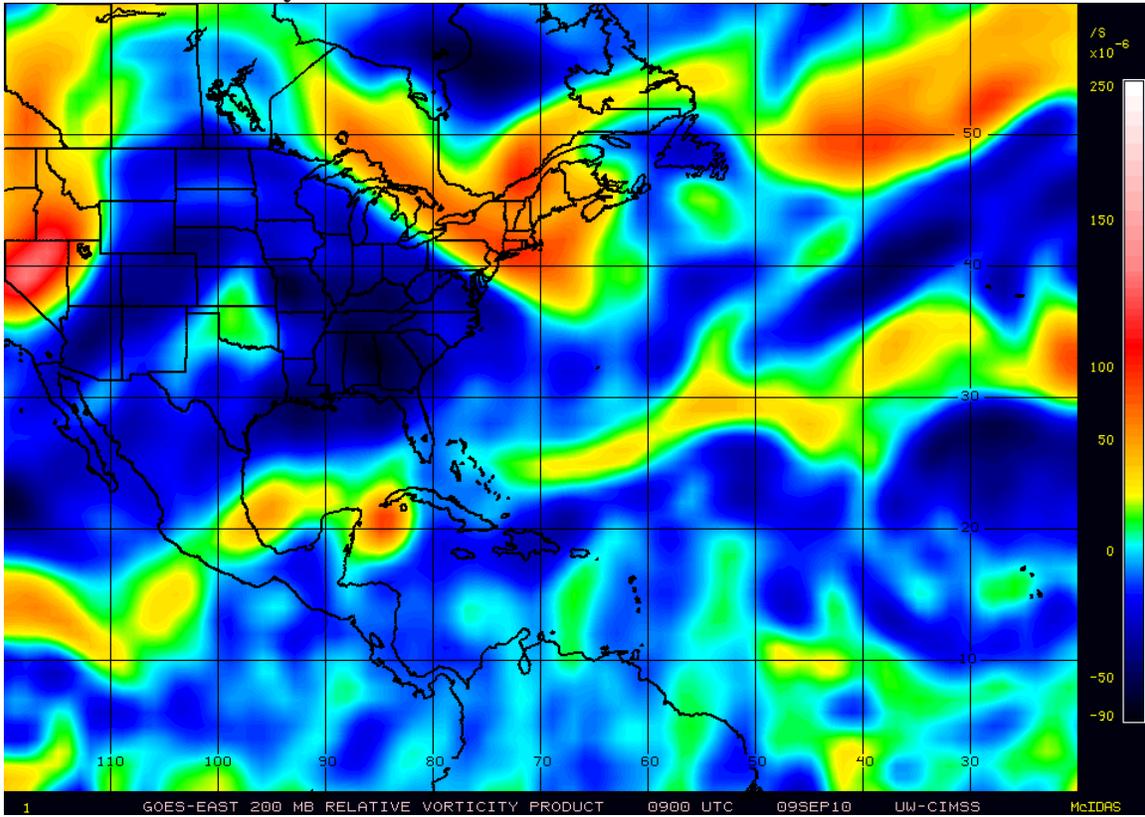
CIMSS Analyses:
C1- Upper Level Winds



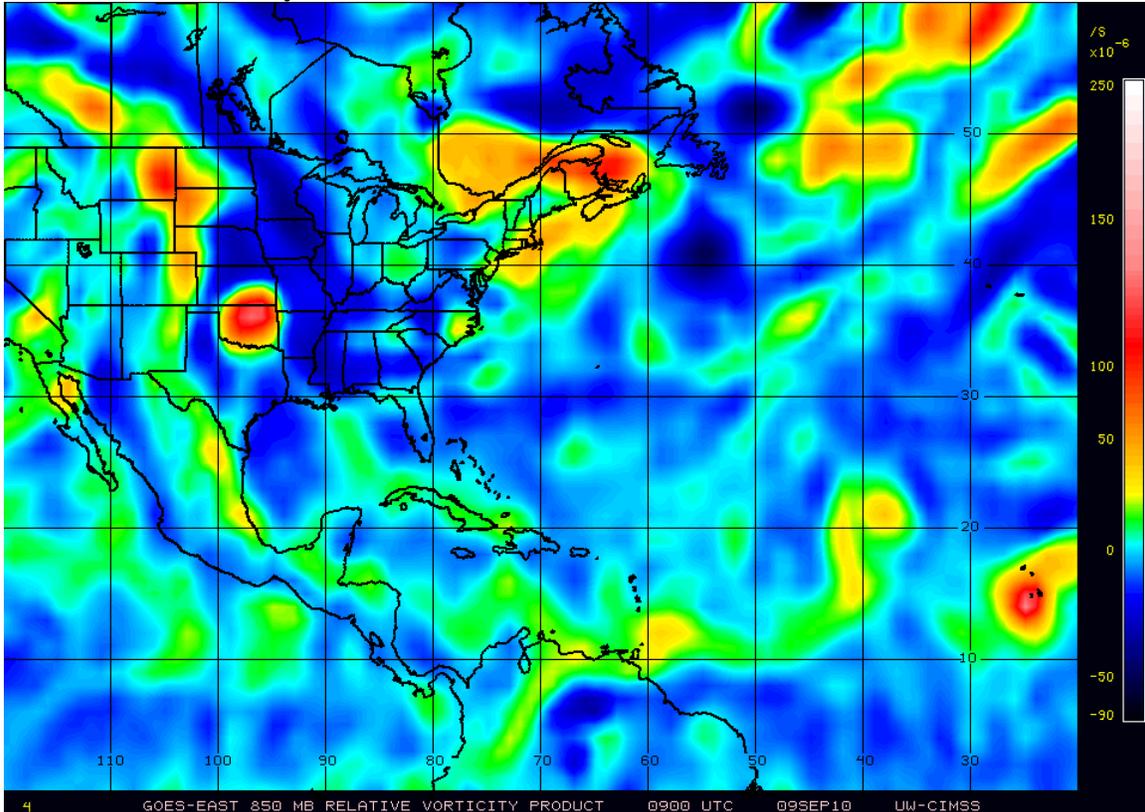
C2- Wind Shear



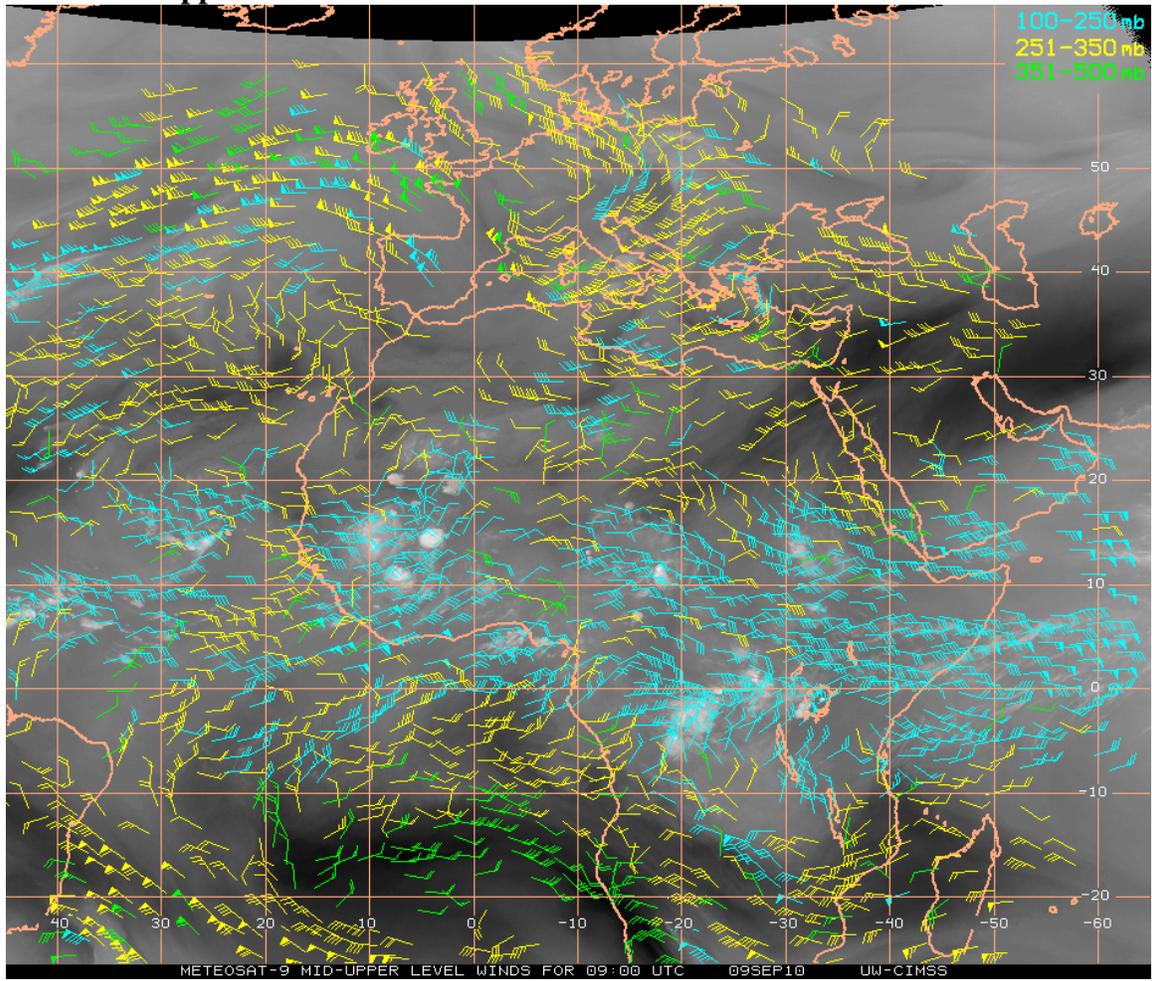
C3- 200 hPa Vorticity



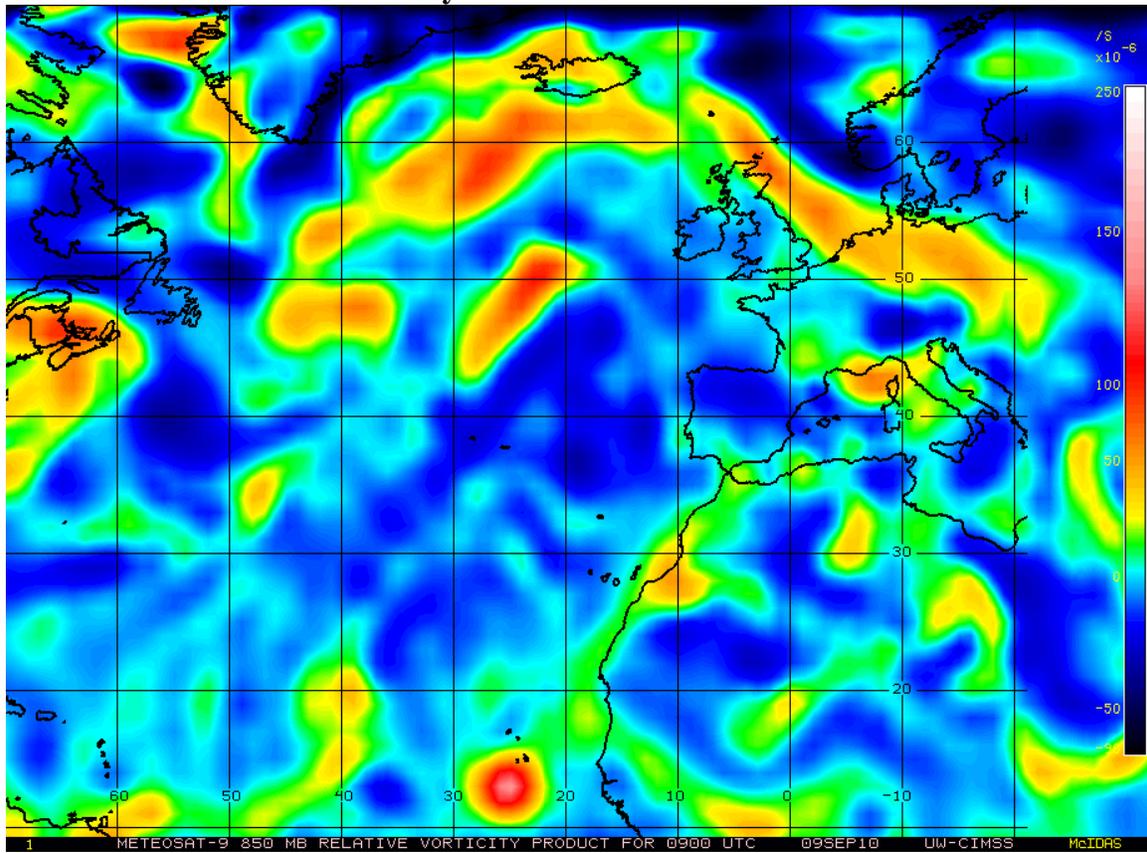
C4- 850 hPa Vorticity



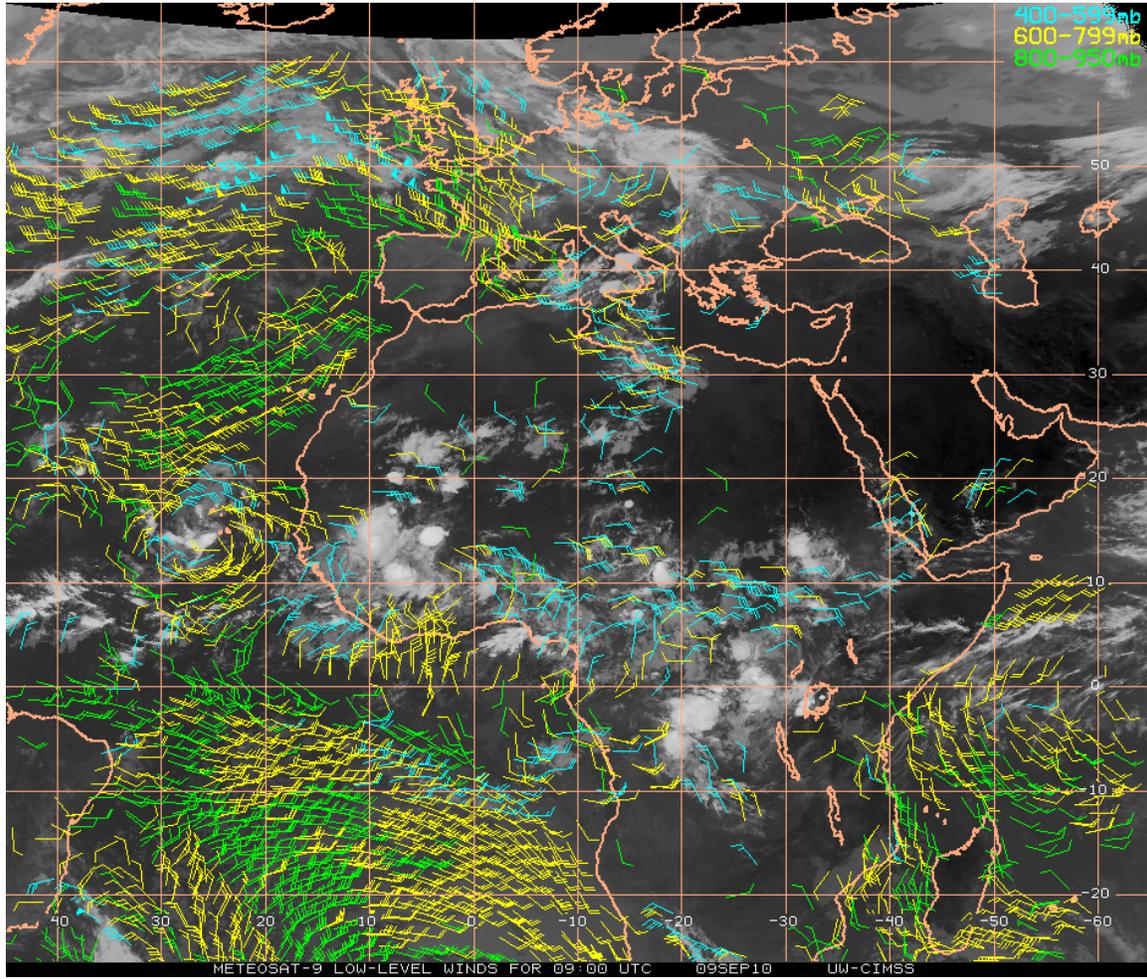
C5- Africa Upper Level Winds:



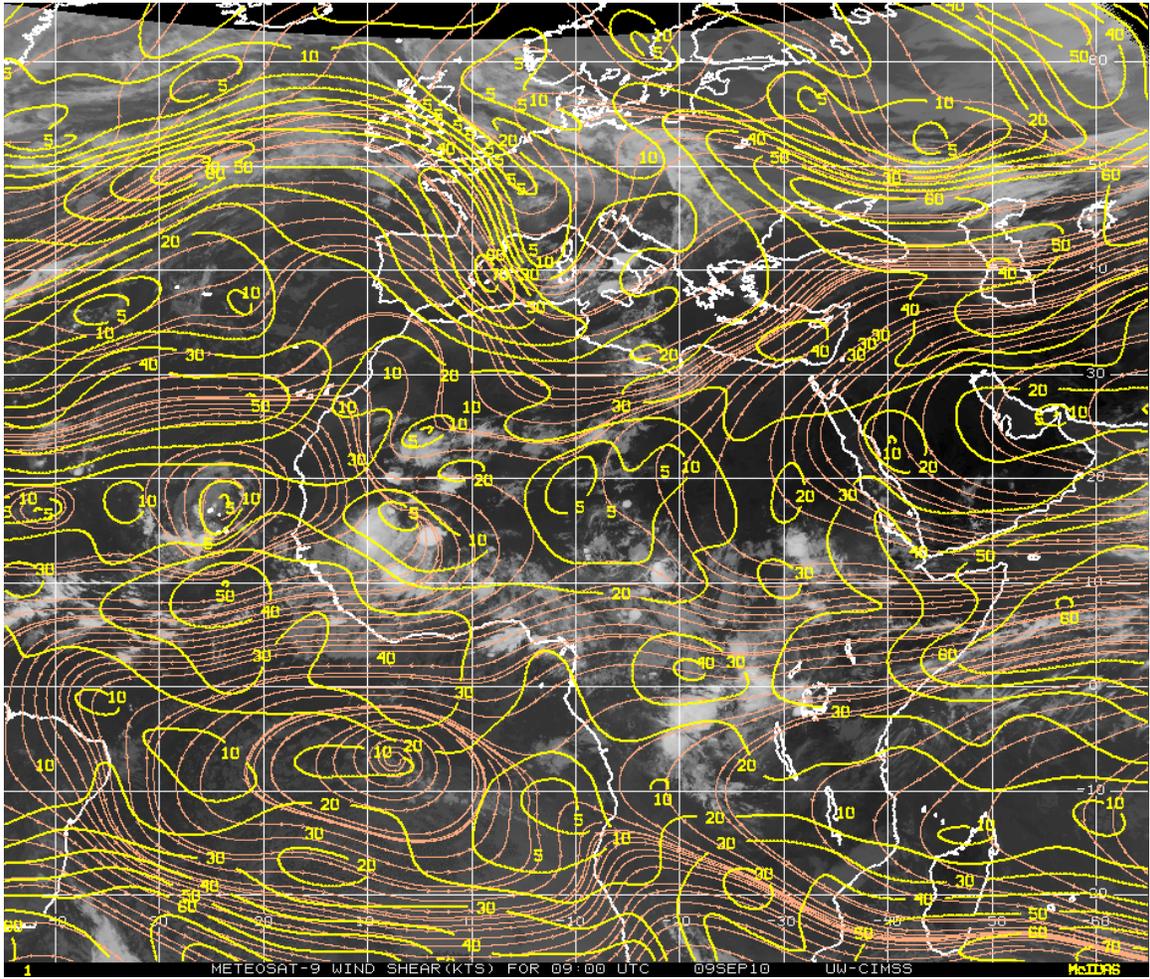
C6- Africa Lower Level Vorticity:



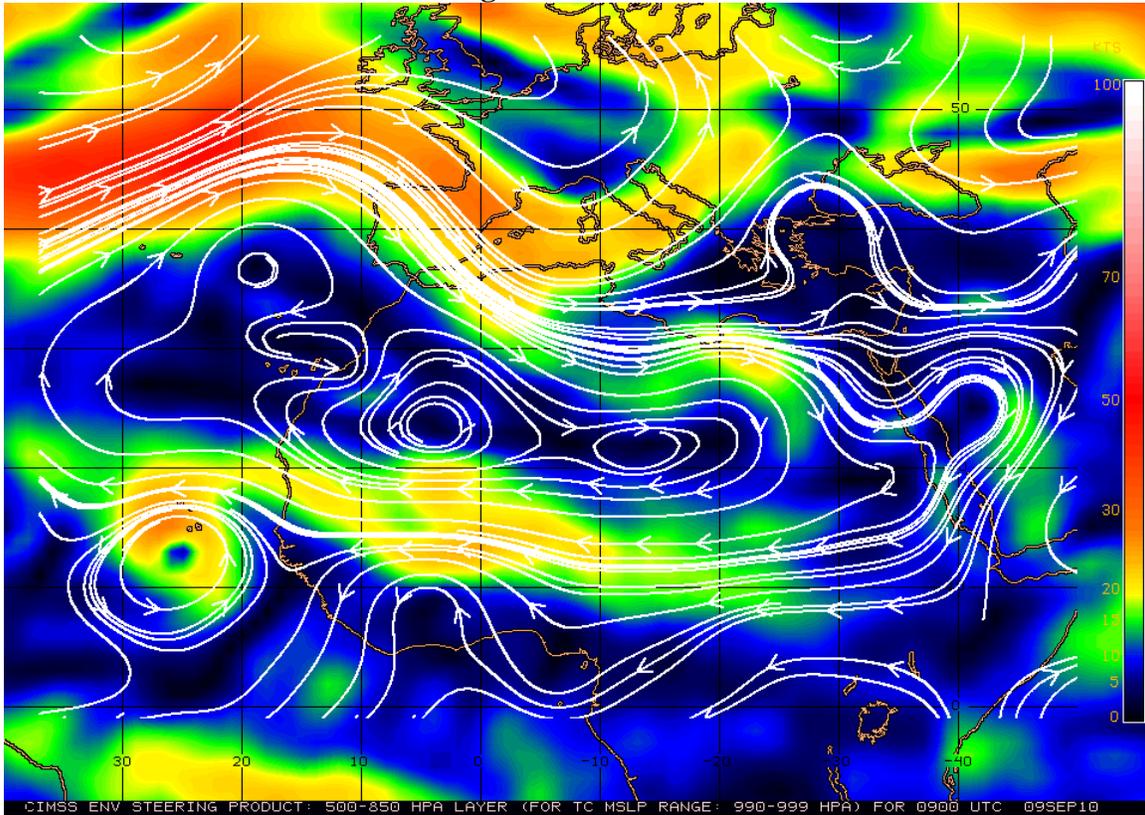
C7- Lower level winds over Africa:



C8- Wind Shear over West Africa:



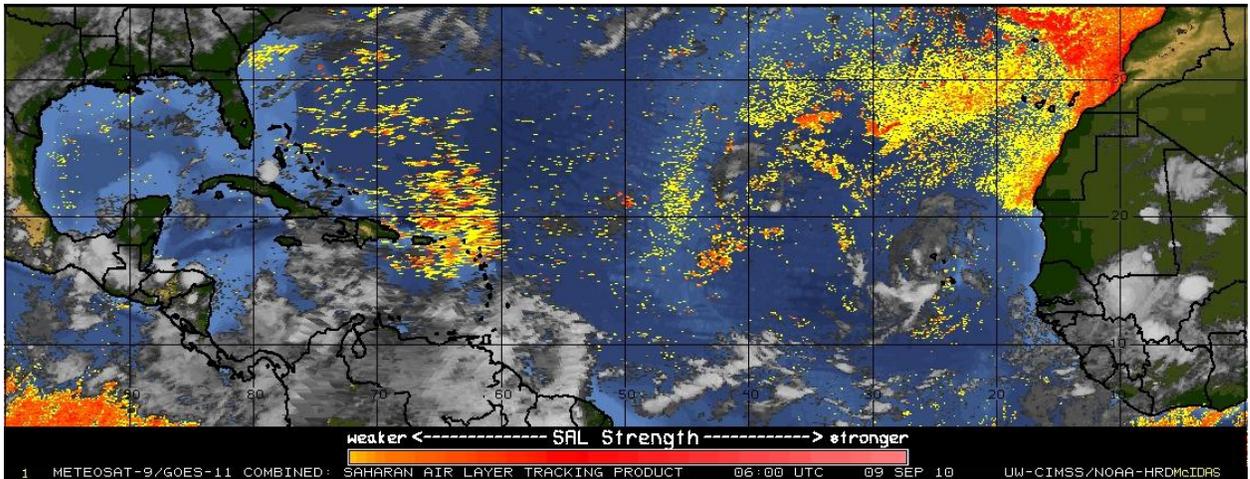
C9- CIMSS Environmental Steering over West Africa for 500-850 hPa:



Features of Interest:

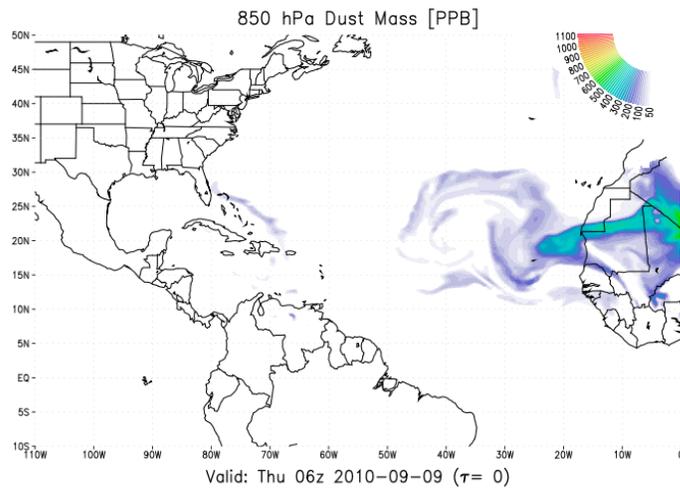
Ex-Gaston/PGI-38L:

G1



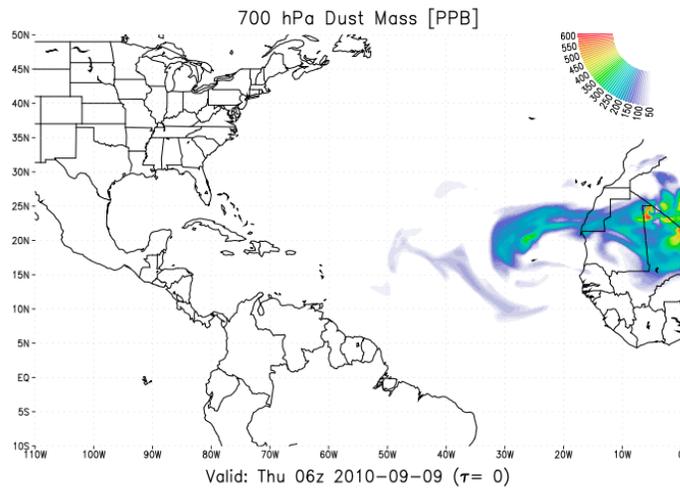
G2

NASA/GSFC Global Modeling and Assimilation Office - GEOS-5 Forecast Initialized on 06z 2010-09-09



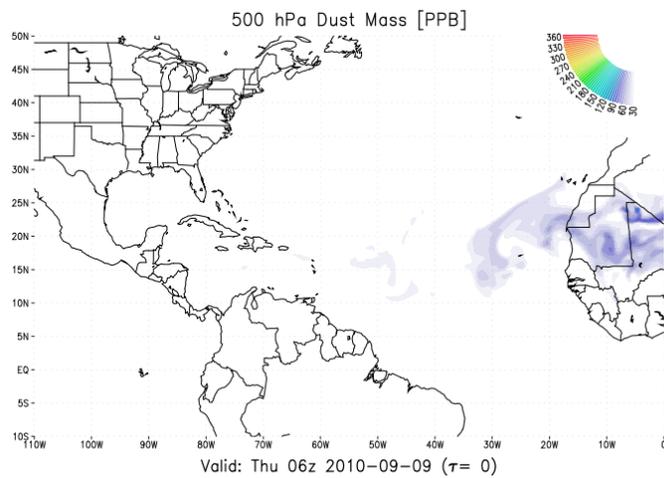
G3

NASA/GSFC Global Modeling and Assimilation Office - GEOS-5 Forecast Initialized on 06z 2010-09-09



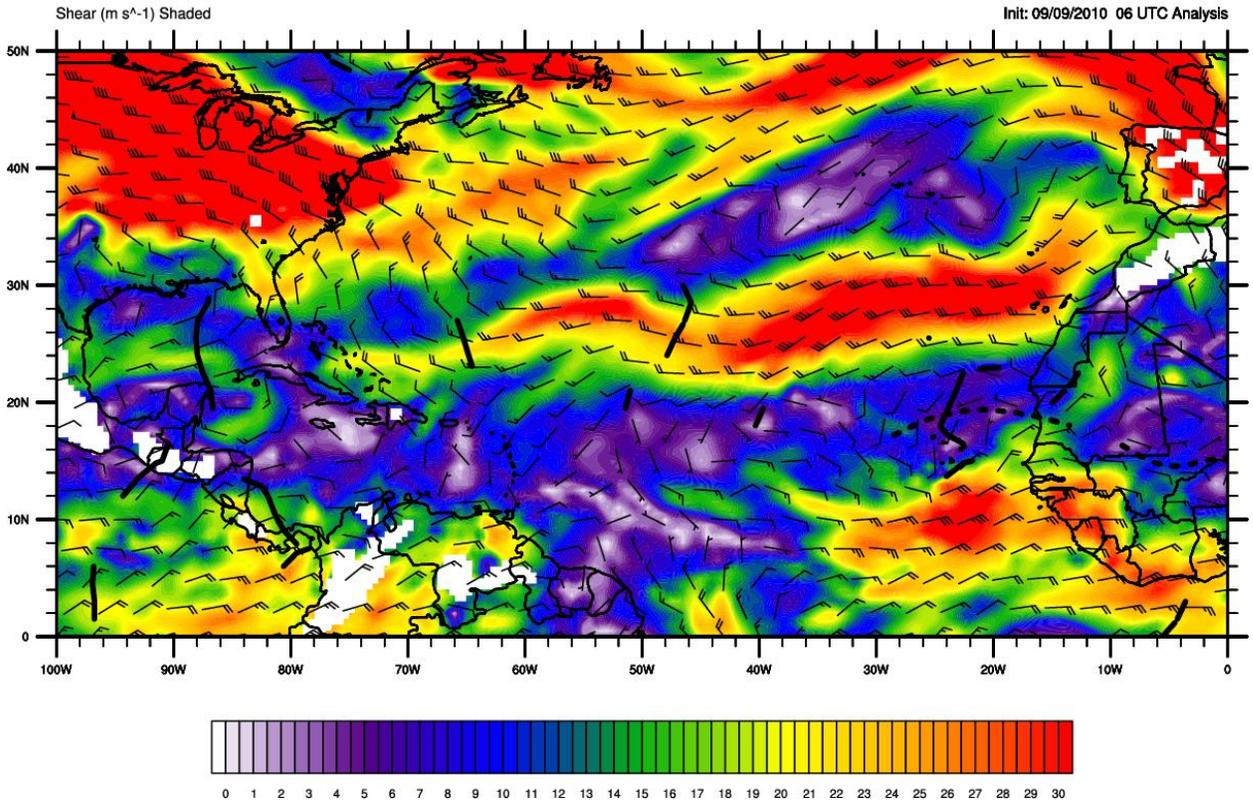
G4

NASA/GSFC Global Modeling and Assimilation Office - GEOS-5 Forecast Initialized on 06z 2010-09-09



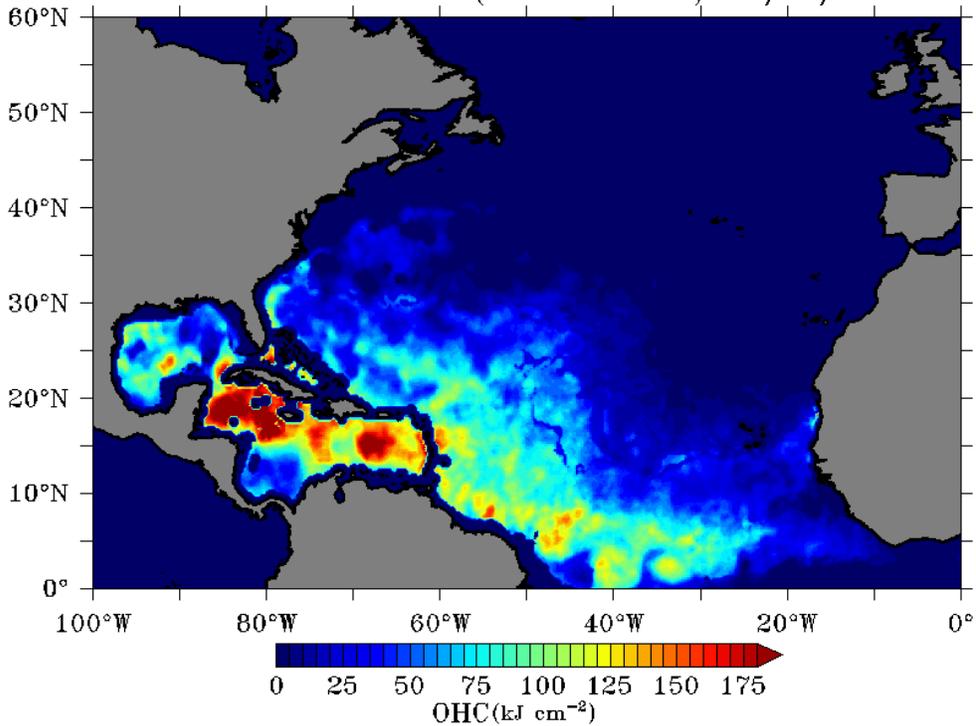
G5

200-900 hPa Wind Shear, Shear Vectors



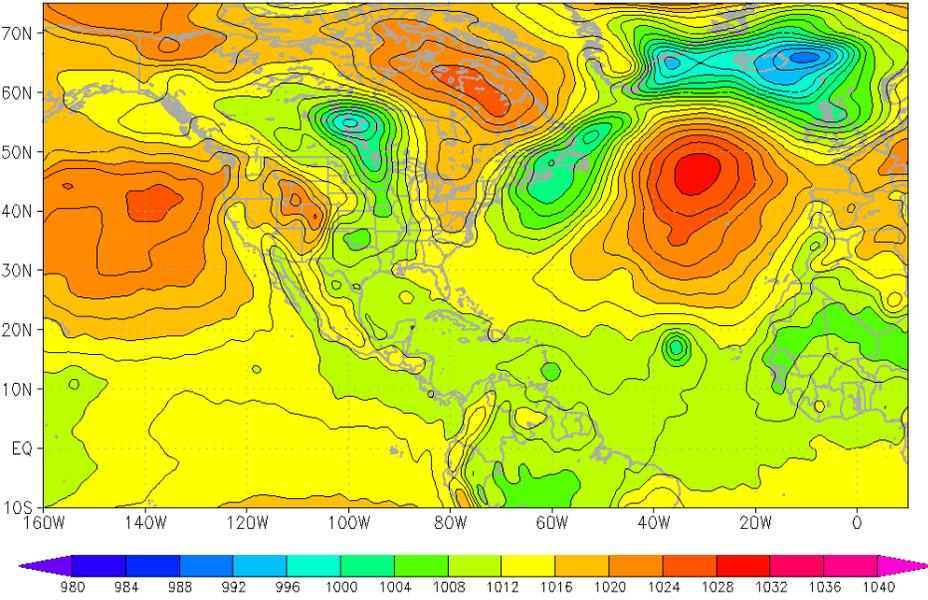
G6

Ocean Heat Content (SSM/I-TMI SST): 09/08/2010

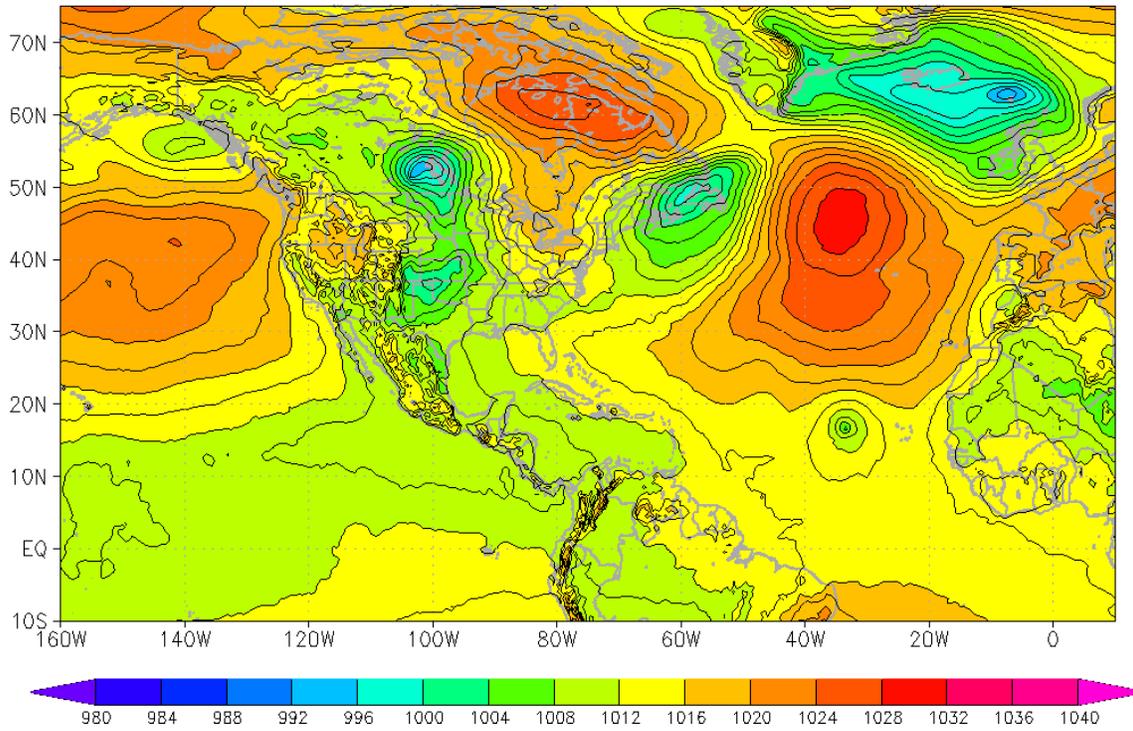


G7

06Z09SEP2010 gfs MSLP (mb) T=48 h

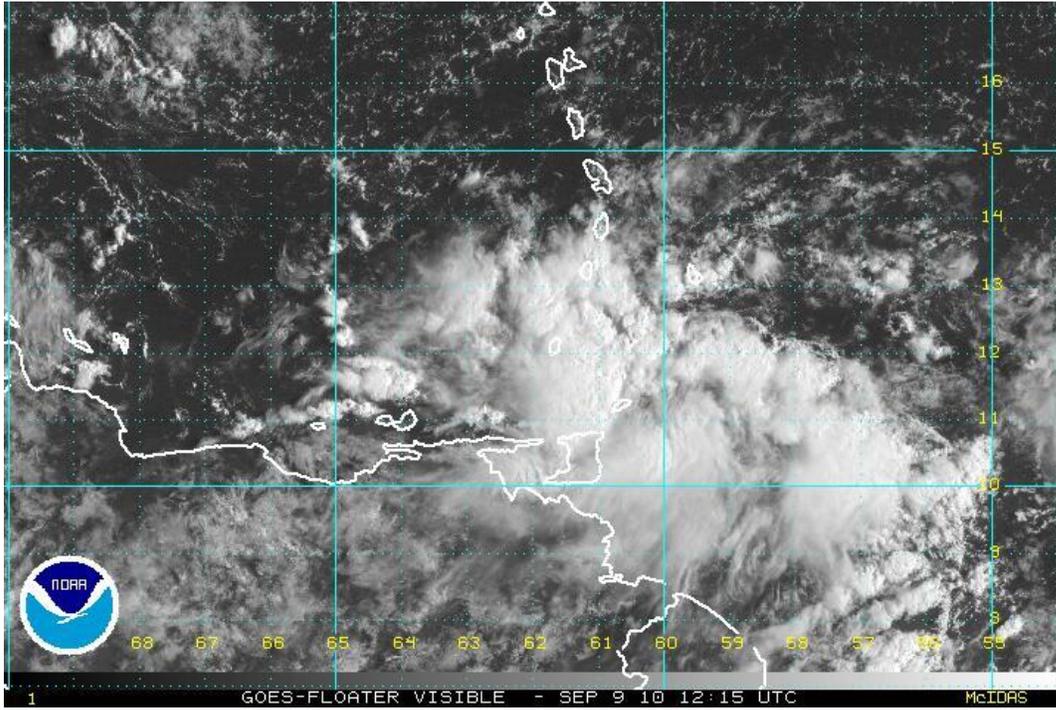


00Z09SEP2010 ecmwf-oper MSLP (mb) T=48 h

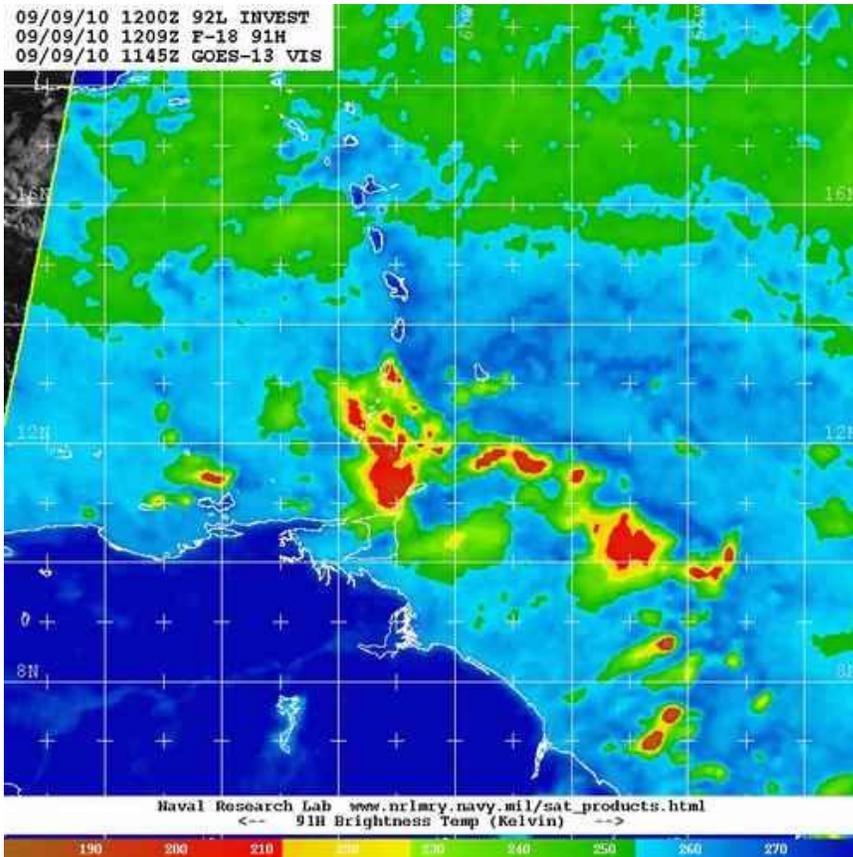


G8

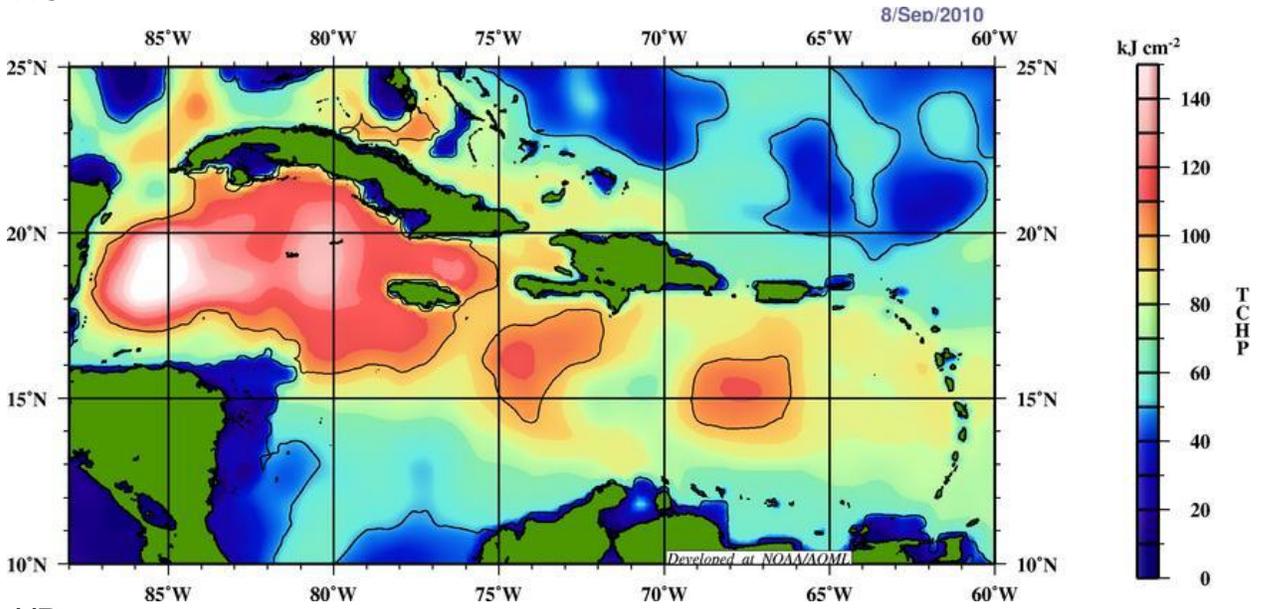
AL92/PGI-44L:
44A-1215UTC GOES Visible



44B-120UTC SSMIS 85GHz Microwave

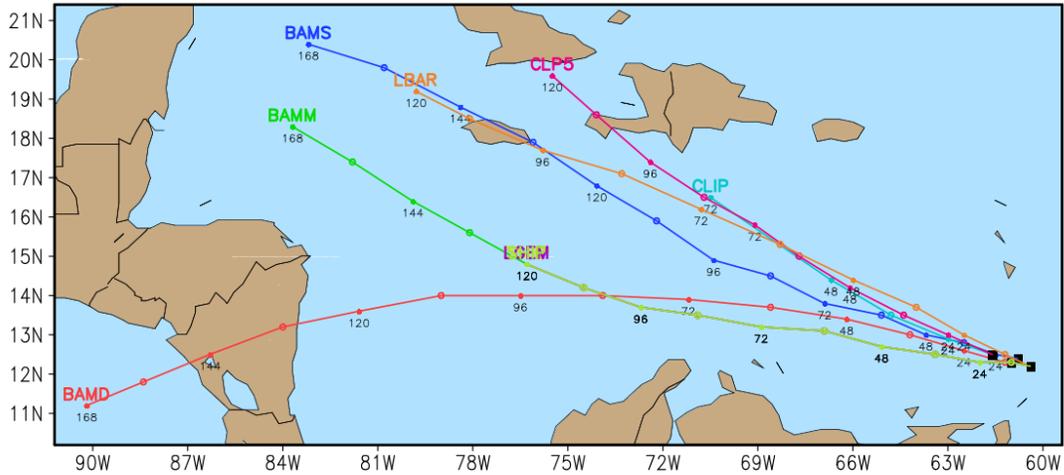


44C



44D

Atlantic INVEST 92 Model Tracks
Valid Time: 1200 UTC 09 September 2010



- MODELS DISPLAYED
- BAMD
 - BAMS
 - BMM
 - CLIP
 - CLP5
 - DSHP
 - LBAR
 - LGEM
 - SHIP

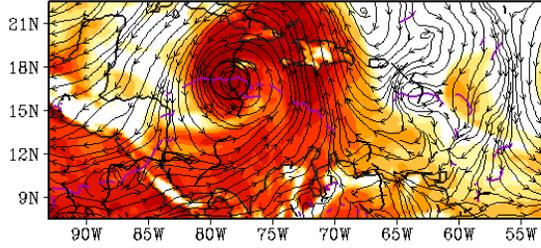
44E-ECMWF Pouch TPW at 120hr

PGI44L: 2010090900 (120h ECMWF valid at 00Z14SEP2010)

Level Tracked: 700 hPa

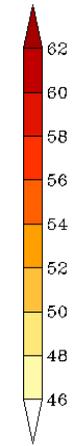
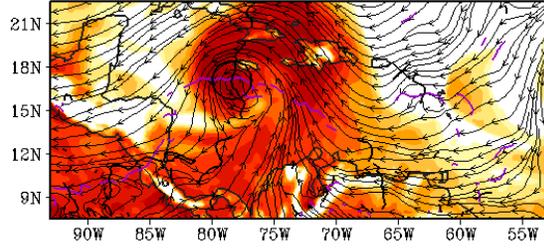
Comoving ($C_p = -3.0$ m/s)

700 hPa Streamlines and TPW kg m^{-2}

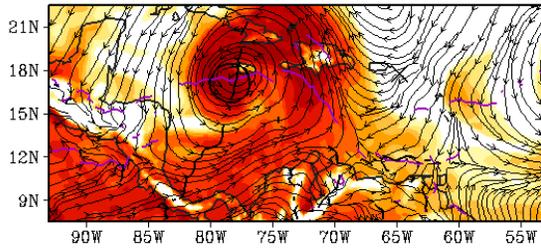


Earth-relative ($C_p = 0$ m/s)

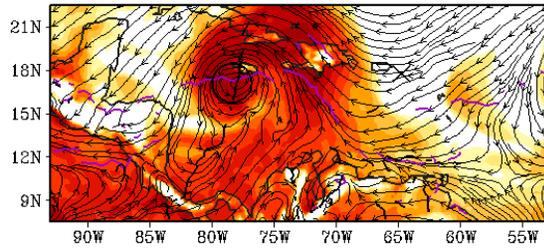
700 hPa Streamlines and TPW kg m^{-2}



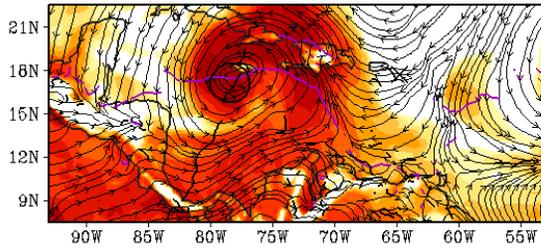
850 hPa Streamlines and TPW kg m^{-2}



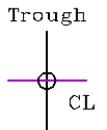
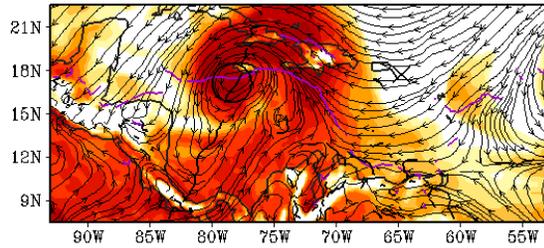
850 hPa Streamlines and TPW kg m^{-2}



925 hPa Streamlines and TPW kg m^{-2}



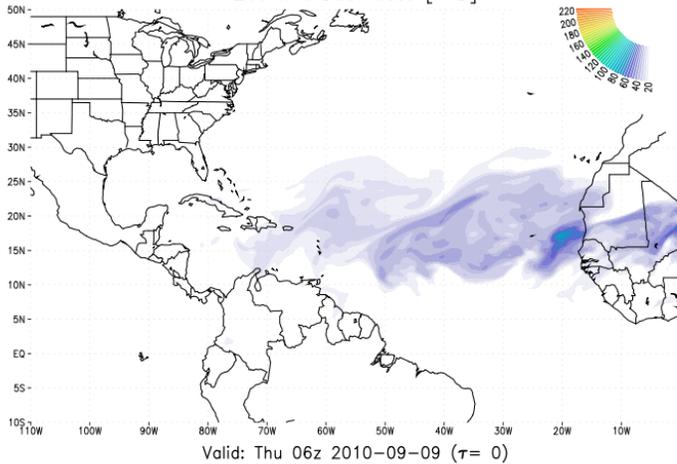
925 hPa Streamlines and TPW kg m^{-2}



PGI-39L: 39A

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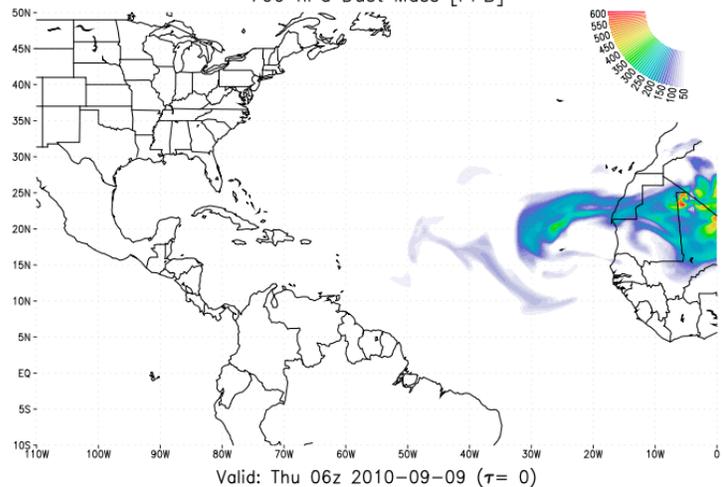
200 hPa Dust Mass [PPB]



39B

NASA/GSFC Global Modeling and Assimilation Office - GEOS-5 Forecast Initialized on 06z 2010-09-09

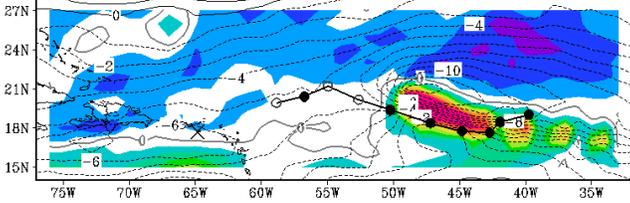
700 hPa Dust Mass [PPB]



39C

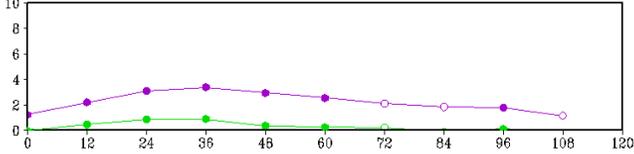
PGI39L: 5-Day Forecast Based on GFS
 Initialized at 2010090900

(a) Track, 700 hPa U and Zeta (5-day average)

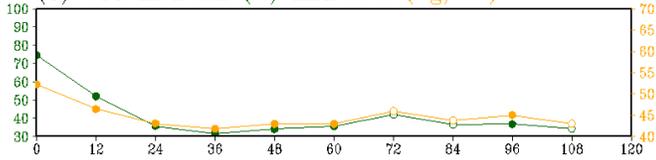


3x3 degree box averages following the pouch:

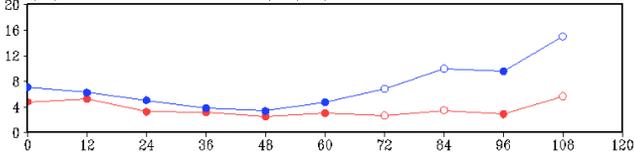
(b) 700 hPa Zeta (10^{-5} s^{-1}) and OW (10^{-9} s^{-2})



(c) 700 hPa RH (%) and TPW (kg/m^2)



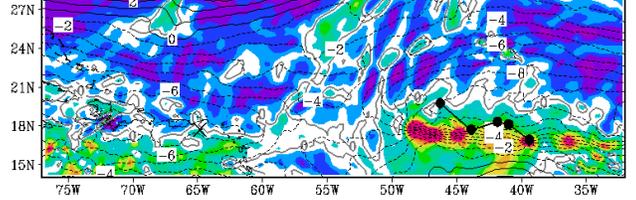
(d) Vertical shear (m/s)
 Deep 200-850 hPa (blue line with circles)
 Pouch 500-850 hPa (red line with squares)



39D

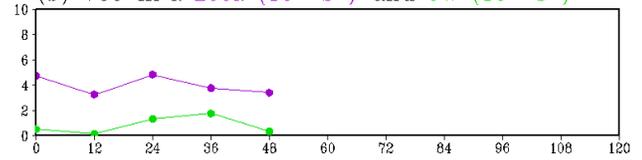
PGI39L: 5-Day Forecast Based on ECMWF
 Initialized at 2010090900

(a) Track, 700 hPa U and Zeta (5-day average)

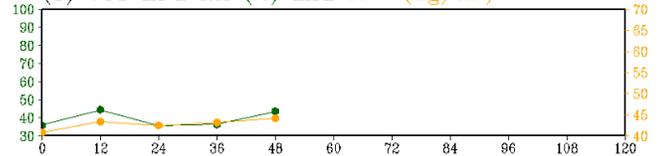


3x3 degree box averages following the pouch:

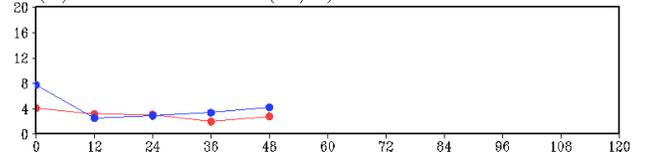
(b) 700 hPa Zeta (10^{-5} s^{-1}) and OW (10^{-9} s^{-2})



(c) 700 hPa RH (%) and TPW (kg/m^2)

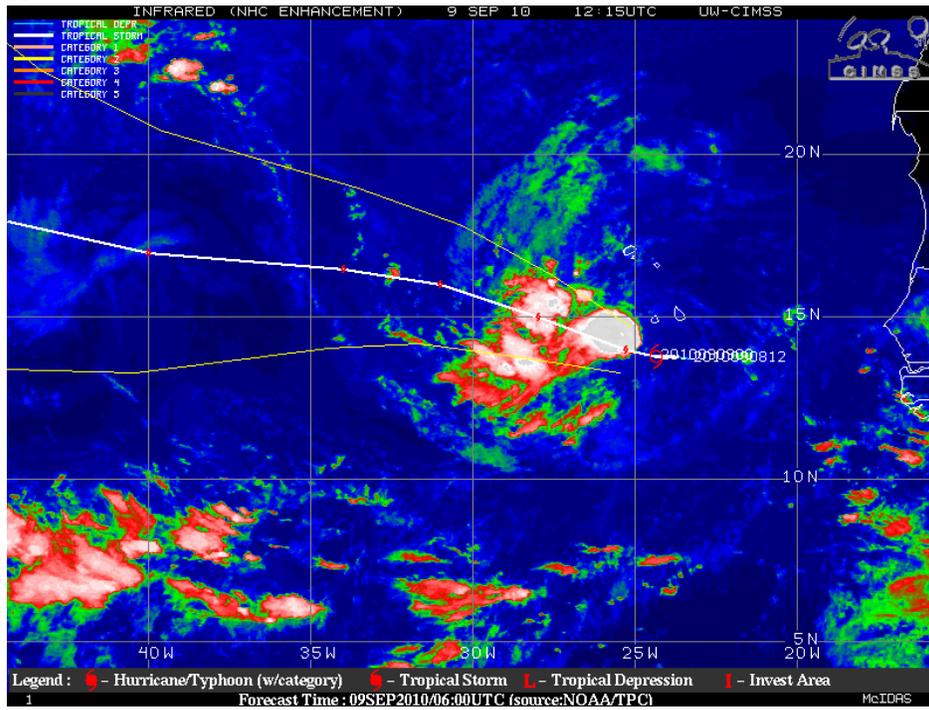


(d) Vertical shear (m/s)
 Deep 200-850 hPa (blue line with circles)
 Pouch 500-850 hPa (red line with squares)

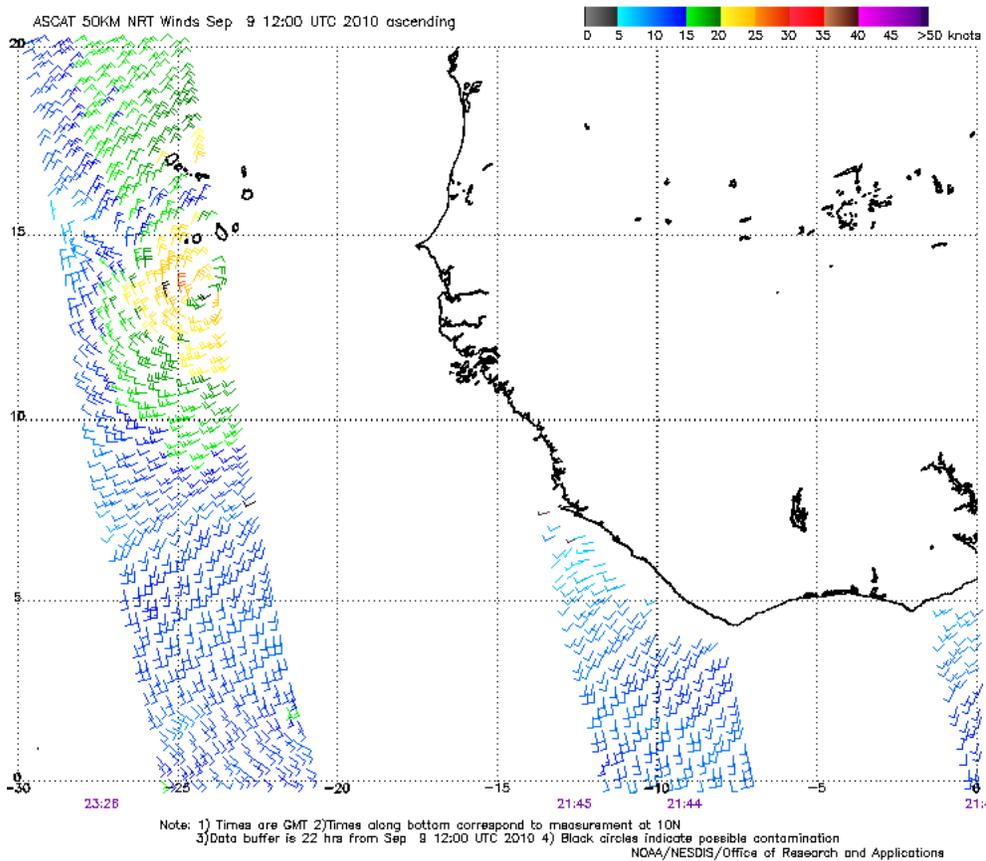


Tropical Storm Igor/PGI-41L and PGI-42L:

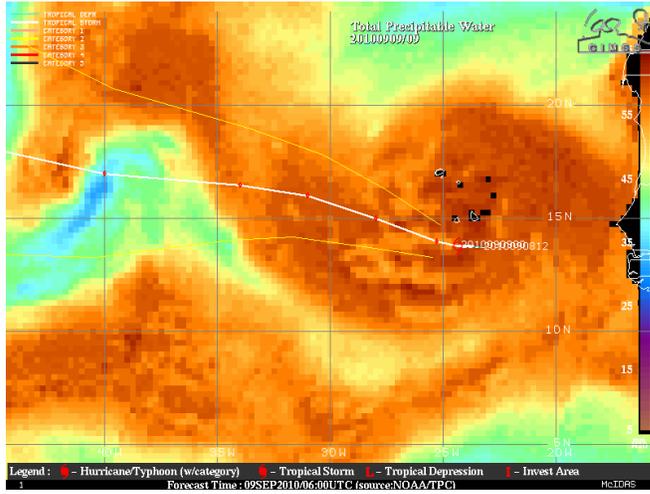
I1:



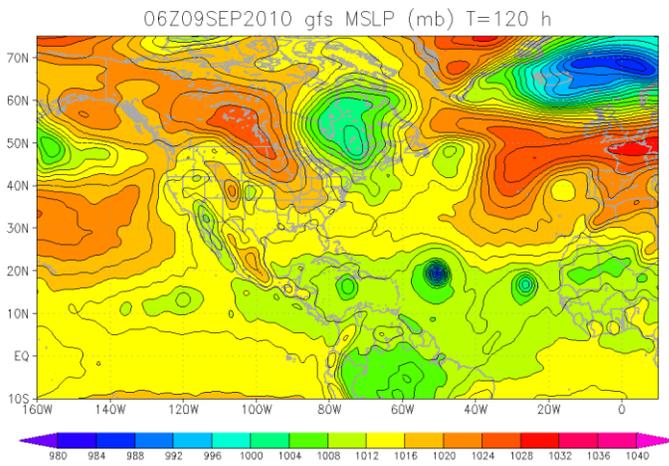
I2:



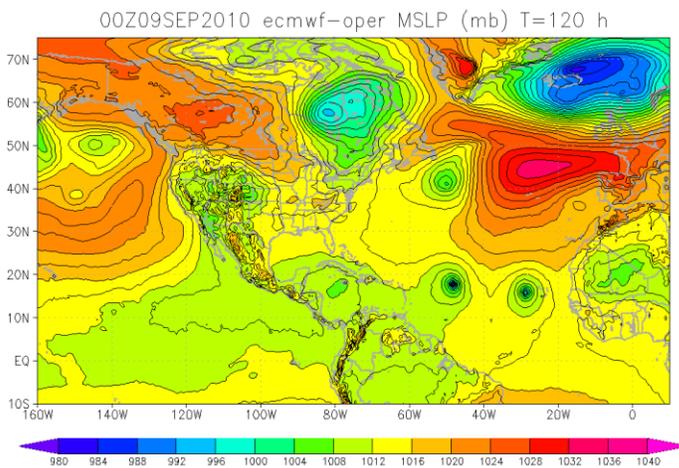
I3:



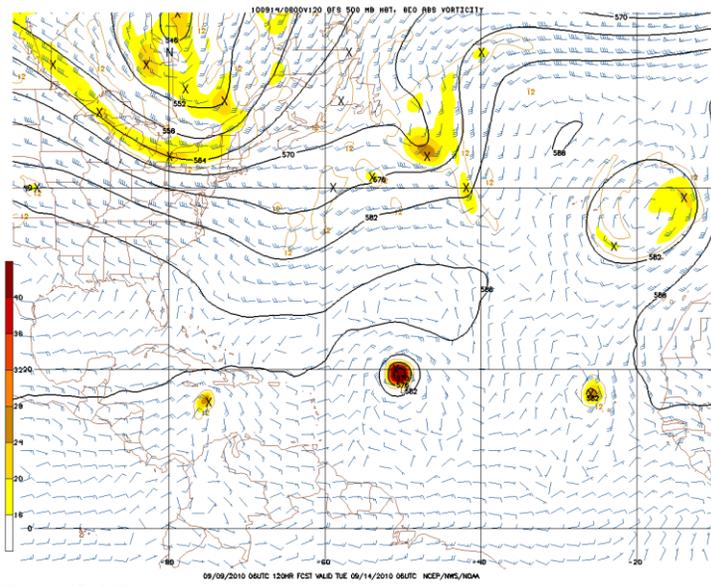
I4:



I5:

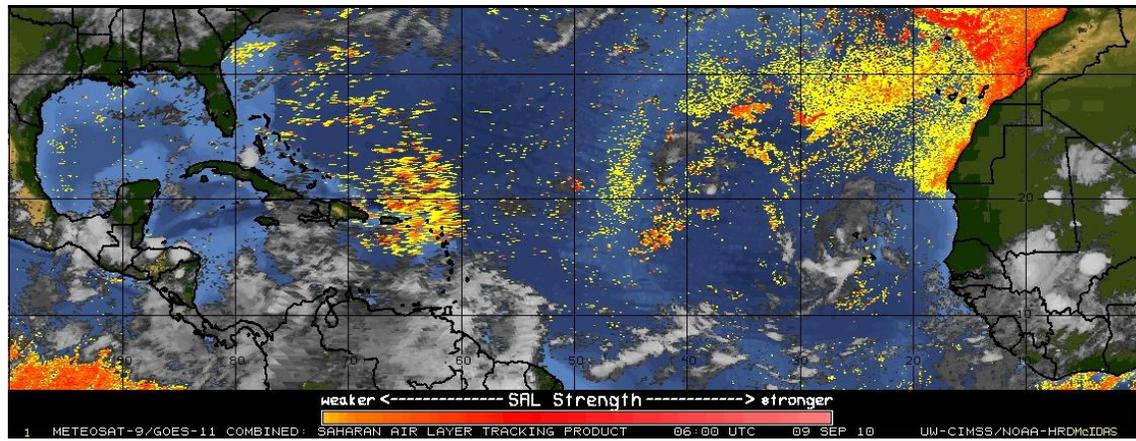


I8:

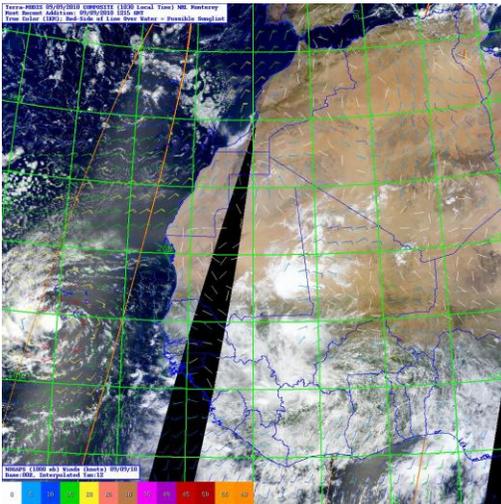


Dust/SAL:

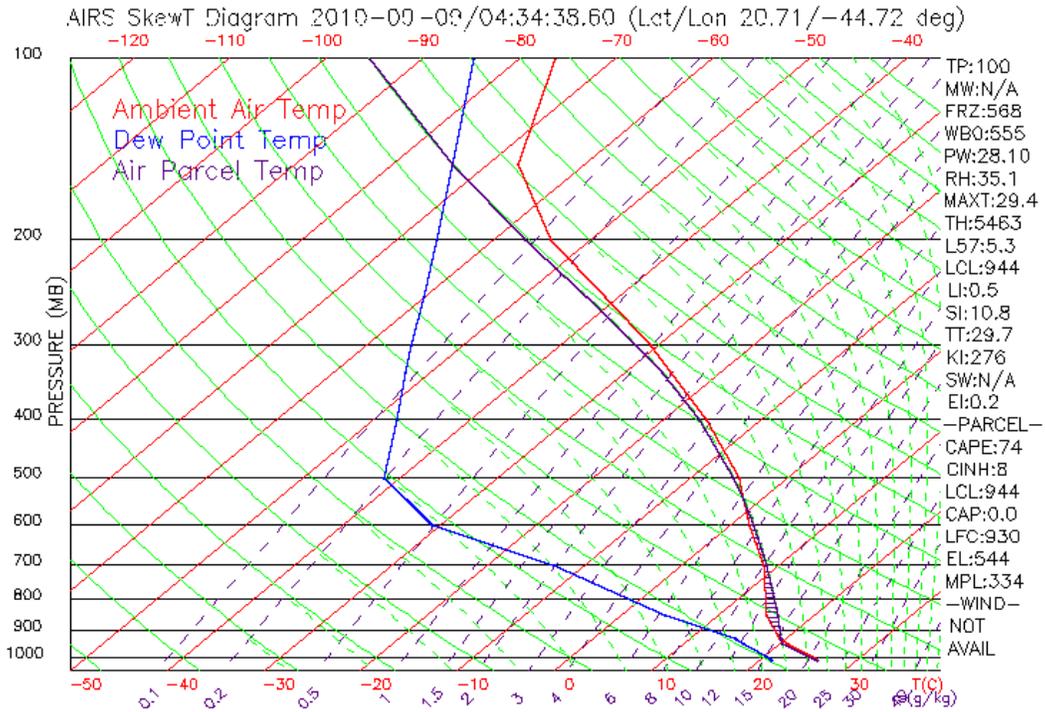
D1



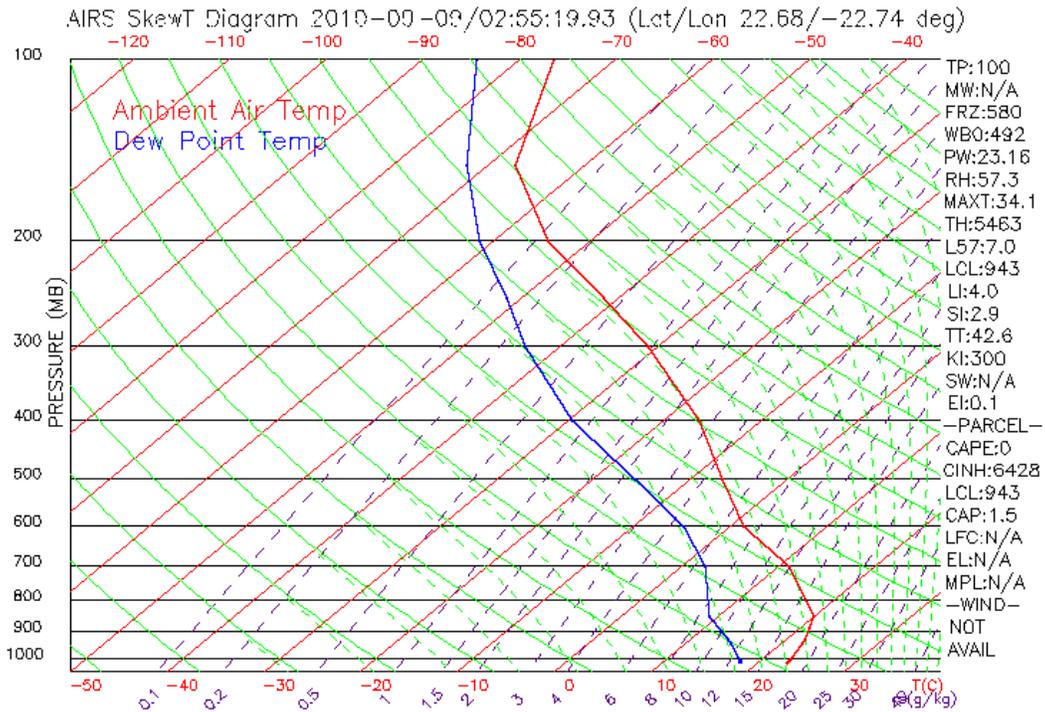
D2



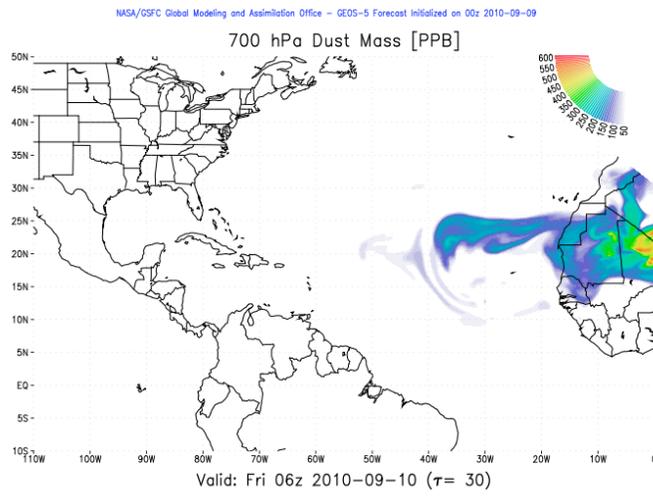
D3



D4



D5



D6

